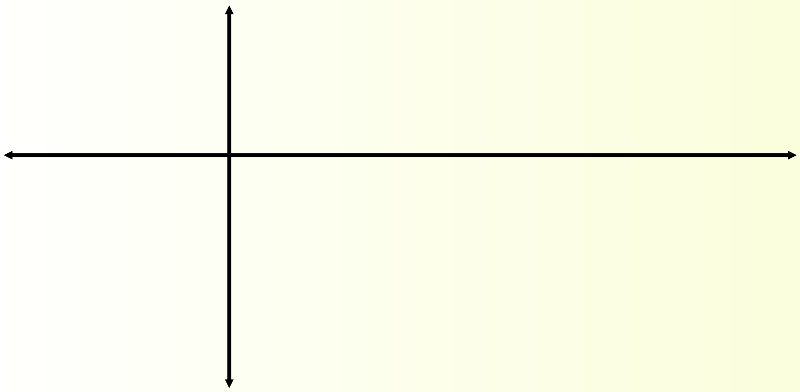
Alg. 2 Warm Up #10-3

1. Describe the transformations of y = sinx that give us $y = 3\sin\left(x + \frac{\pi}{4}\right) - 2$, then graph one cycle.

Label the line of oscillation.



HW Questions:

Review & Preview

7-144. Use what you learned in class to complete parts (a) through (c) below.

a. Describe what the graph of $y = 3\sin(\frac{1}{2}x)$ will look like compared to the graph of $y = \sin x$. Vertical stretch of 3, so the amplitude = 3
Horizontal Stretch, It will have half a cycle in 2π, Period = 4π

b. Sketch both graphs on the same set of axes.

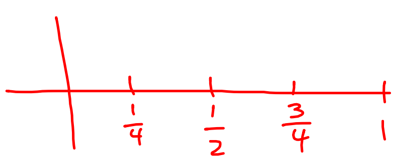
c. Explain the similarities and differences between the two graphs.

7-145. What is the period of $y = \sin(2\pi x)$? How do you know?

$b = 2\pi$

$Per = \frac{2\pi}{2\pi} = 1$

$Per = \frac{2\pi}{b}$



7-146. Colleen and Jolleen both used their calculators to find $\sin 30°$. Colleen got $\sin 30° = -0.9880316241$, but Jolleen got $\sin 30° = 0.5$. Is one of their calculators broken, or is something else going on? Why did they get different answers?

7-147. Ceirin's teacher promised a quiz for the next day, so Ceirin called Adel to review what they had done in class. *"Suppose I have* $y = \sin 2x$*,"* said Ceirin, *"what will its graph look like?"*

"It will be horizontally compressed by a factor of 2," replied Adel, *"so the period must be* π*."*

"Okay, now let's say I want to shift it one unit to the right. Do I just subtract 1 from x, like always?"

$y = \sin(2x-1)$ $y = \sin 2(x-1)$

"I think so," said Adel, *"but let's check on the graphing calculator."* They proceeded to check on their calculators. After a few moments they both spoke at the same time.

$2(x-\frac{1}{2})$

"Rats," said Ceirin, *"it isn't right."*

"Cool," said Adel, *"it works."*

When they arrived at school the next morning, they compared the equations they had put in their graphing calculators while they talked on the phone. One had $y = \sin 2x - 1$, while the other had $y = \sin 2(x-1)$.

Which equation was correct? Did they both subtract 1 from x? Explain. Describe the rule for shifting a graph one unit to the right in a way that avoids this confusion.

7-148. George was solving the equation $(2x-1)(x+3) = 4$ and he got the solutions $x = \frac{1}{2}$ and $x = -3$. Jeffrey came along and said, *"You made a big mistake! You set each factor equal to zero, but it's not equal to zero, it's equal to 4. So you have to set each factor equal to 4 and then solve."* Who is correct? Show George and Jeffrey how to solve this equation. To be sure that you are correct, check your solutions.

There is no "4 product prop."

silly.

7-149. Compute the value of each expression without using a calculator.

a. $\log(8)+\log(125)$

b. $\log_{25}(125) = y$

c. $\frac{1}{2}\log(25)+\log(20)$

d. $\boxed{7^{\log_7(12)} = 12}$

$\log(8\cdot 125)$

$\log_{10} 1{,}000$

$\boxed{3}$

because $10^3 = 1{,}000$

Write in exponent form:

$25^y = 125$

Now make the bases match → Base 5

$(5^2)^y = 5^3$

$2y = 3$

$y = \frac{3}{2}$

so $\log_{25}(125) = \boxed{\frac{3}{2}}$

$7^{\log_7 12} = y$

$\log_7 y = \log_7 12$

$\log_2 8$

7-150. An exponential function $y = km^x + b$ passes through (3, 7.5) and (4, 6.25). It also has an asymptote at $y = 5$ → up 5, so $b=5$

a. Find the equation of the function.

b. If the equation also passes through (8, w), what is the value of w?

$y = km^x + 5$

Now put in the points to create a system of 2 equations.

$6.25 = km^4 + 5$
$-5 \quad -5$

$7.5 = km^3 + 5$
$-5 \quad -5$

$1.25 = km^4$

$2.5 = km^3$

To solve by elimination

$$\frac{1.25}{2.5} = \frac{\cancel{k}m^4}{\cancel{k}m^3}$$

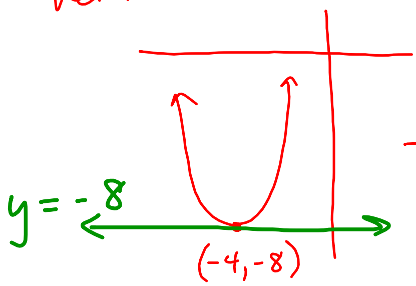
Keep going! :)

7-151. Consider the equation $f(x) = 3(x+4)^2 - 8$.

a. Find an equation of a function $g(x)$ such that $f(x)$ and $g(x)$ intersect in only one point.

b. Find an equation of a function $h(x)$ such that $f(x)$ and $h(x)$ intersect in no points.

vertex $(-4,-8)$



The line $y=-8$ would only intersect once.

Yesterday's CP's:

7-141. *Without* using a graphing calculator, describe each of the following functions by stating the amplitude, period, horizontal shift, and midline (vertical shift). Using this information, sketch the graph of each function. *After* you have completed each graph, check your sketch with a graphing calculator and correct and explain any errors.

$b=2$

$per = \frac{2\pi}{2}$

a. $y = \sin 2(x - \frac{\pi}{6})$

b. $y = 3 + \sin(\frac{1}{3}x)$

c. $y = 3\sin(4x)$

d. $y = \sin\frac{1}{2}(x+1)$

e. $y = -\sin 3(x - \frac{\pi}{3})$

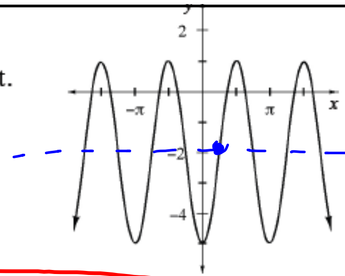
f. $y = -1 + \sin(2x - \frac{\pi}{2})$

$\sin 2(x - \frac{\pi}{4})$

$y = a \sin b(x-h) + k$

$= 1 \sin 2(x - \frac{\pi}{4}) - 1$

7-142. Farah and Thu were working on writing the equation of a sine function for the graph at right. They figured out that the amplitude is 3, the $\boxed{\text{horizontal shift is } \frac{\pi}{4}}$ and the midline is $y=-2$. They can see that the period is π, but they disagree on the equation. Farah has written $f(x)=3\sin 2(x-\frac{\pi}{4})-2$ and Thu has written $f(x)=3\sin(2x-\frac{\pi}{4})-2$.



a. Whose equation is correct? How can you be sure?

b. Graph the incorrect equation and explain how it is different from the original graph.

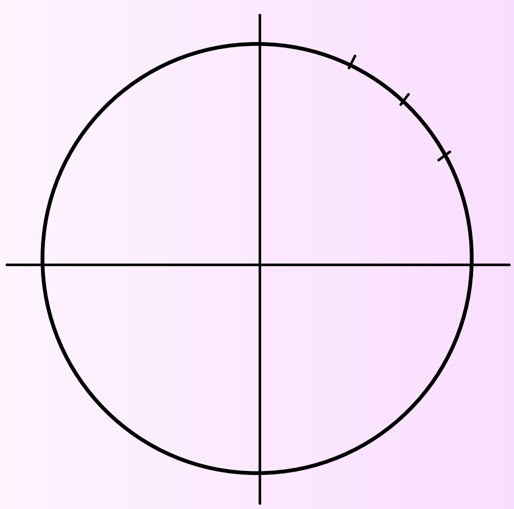
rewrite

$f(x)=3\sin 2(x-\frac{\pi}{8})-2$

$R+\frac{\pi}{8}$

Unit Circle as a tool...

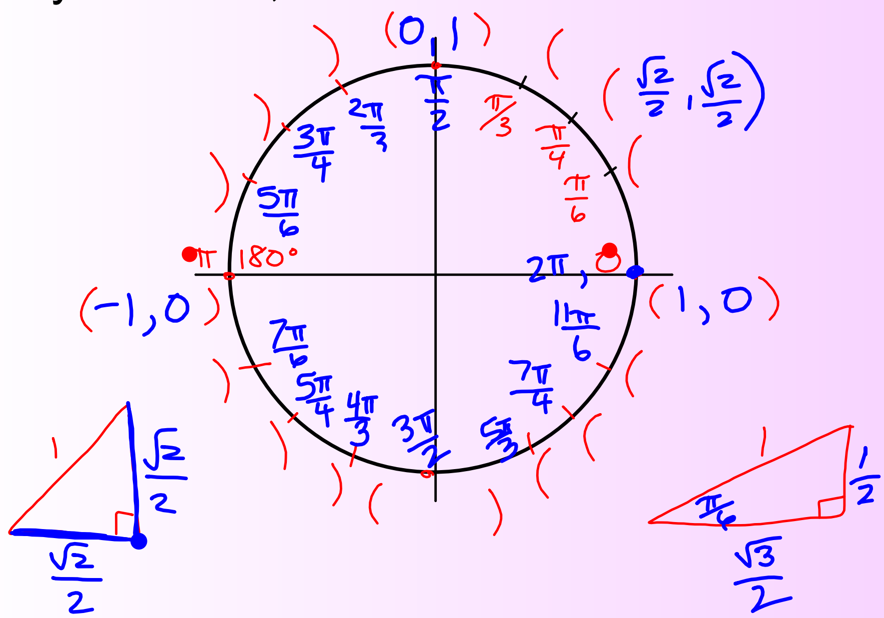
Try to completely fill it in without looking at your notes, book or calculator.



Unit Circle as a tool...

(x, y)
(cos θ, sin θ)

Try to completely fill it in without looking at your notes, book or calculator.



CP's: 7- #152 ---> 155 (over 2 days)

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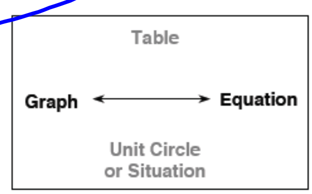
7.2.4 What are the connections?

Skip 154 today

Graph ↔ Equation

In the past few lessons, you have been developing the understanding necessary to graph a cyclic equation without making a table and to write an equation from a cyclic graph. In today's lesson, you will strengthen your understanding of the connections between a cyclic equation and its graph. By the end of this lesson, you will be able to answer the following questions:



Does it matter if we use sine or cosine?

What do we need to know to make a complete graph or write an equation?

together:

7-152. What do you need to know about the sine or cosine functions to graph them or write their equations? Talk with your team and write a list of all of the attributes of a sine or cosine function that you need to know to write an equation and graph it.

7-153. CREATE-A-CURVE

Split your team into pairs. With your partner, you will create your own sine or cosine function, write its equation, and draw its graph. Be sure to keep your equation and graph a secret! Start by choosing whether you will work with a sine or a cosine function.

a. Half the distance from the highest point to the lowest point is called the **amplitude**. You can also think of amplitude as the vertical stretch. What is the amplitude of your function?

b. How far to the left or right of the y-axis will your graph begin? In other words, what will be the **horizontal shift** of your function?

c. How much above or below the x-axis will the center of your graph be? In other words, what will be the **midline** of your function?

d. What will the **period** of your function be?

e. What will the **orientation** of your graph in relation to $y = \sin x$ or $y = \cos x$ be? Is it the same or is it flipped?

f. Now that you have decided on all of the attributes for your function, write its equation.

7-154. Copy the equation for your curve from problem 7-153 on a clean sheet of paper. Trade papers with another [redacted]. team

team

a. Sketch a graph of the equation you received from the other [redacted]s.

b. When you are finished with your graph, give it back so they can check the accuracy of your graph.

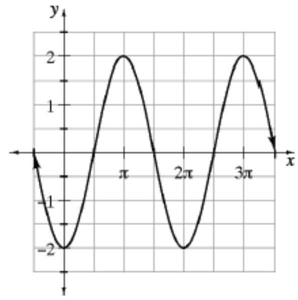
Thursday

7-155. When you look at a graph and prepare to write an equation for it, do you think it matters if you choose sine or cosine? Which do you think will work best?

With your team, find *at least four* different equations for the graph at right. Be prepared to share your equations with the class.

a. Did it matter if you choose sine or cosine?

b. Which of your equations do you prefer? Why?



HW: 7-

#158 ---> 166

Home stretch: Finish strong!

Group Quiz: Friday

(Grapher and notes ok. Topics:
Graphing a transformed sine graph
Solving equations with radicals
Solve by completing the square
Special Triangles)

Unit Circle: Monday
Test 7: Tuesday